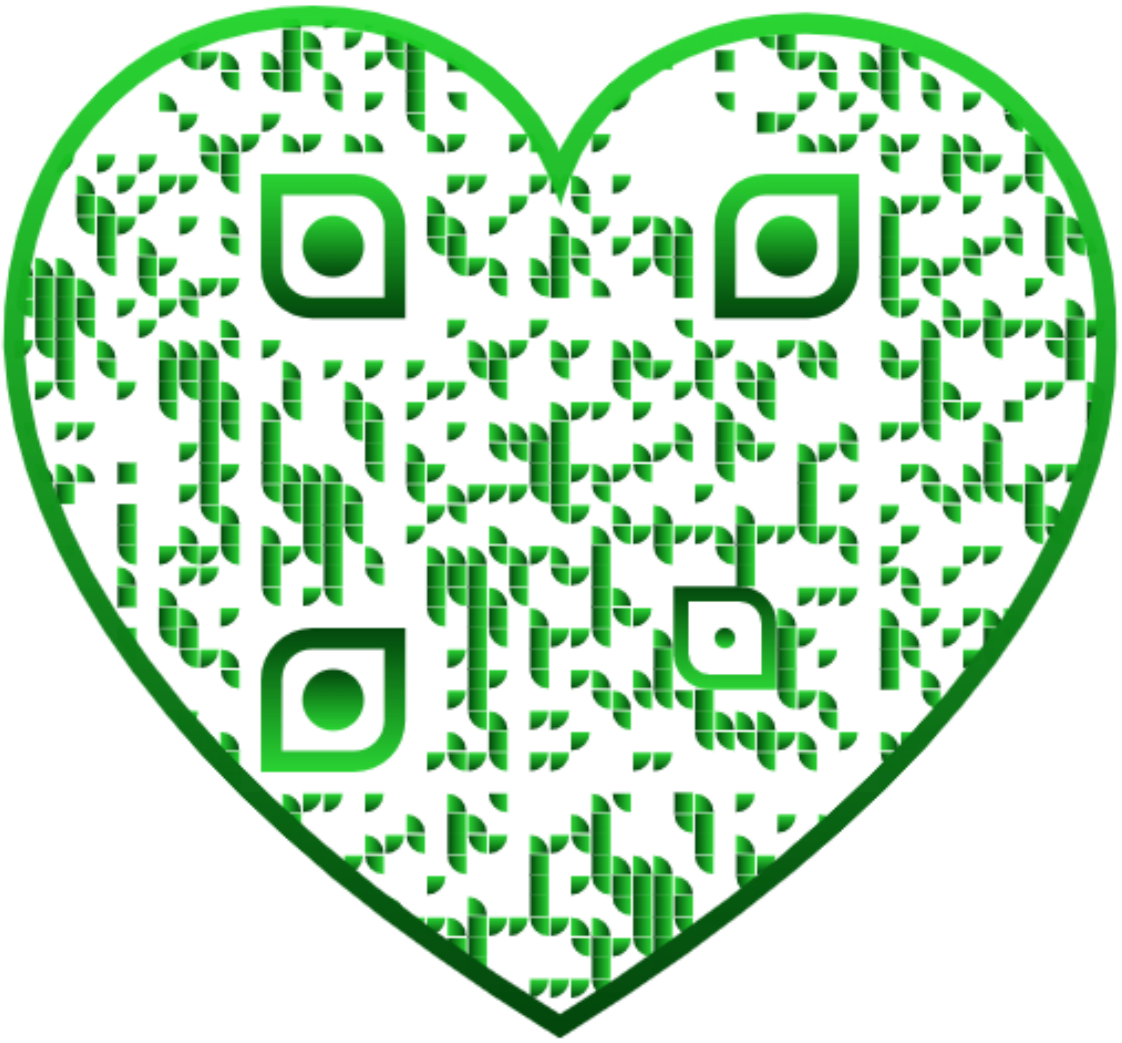
اعداد الطالبه /هديل الصنعاني



Analytical Chemistry 1 ☺

1 _ introduction some basic concepts.
2_ Volumetric titration quantitative analysis
3_ Solution & concentrations
4_ acid _ base
5_ acid _ Base equilibria
6 _ Neutralization
7. Indicators

1 mole = ~~M~~ 1.wt

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1 _ ~~M~~ ole (n) : عدد المولات Amount of Substance (SI)

element $n = \frac{mg}{A.wt}$ Atomic wight الوزن الذري

compound $n = \frac{mxg}{M.wt}$ Molecular wight الوزن الجزيئي

~~M~~ olecular wight (~~M~~ .wt)
حاصل ضرب الاوزان الذريه في المركب لجميع الذرات 1 مول من اي مادة = وزنها الجزيئي.

What is the ~~M~~ .wt CH_3COOH ?
C = 12 , H = 1 , O = 16 A.wt عدد العناصر في المركب × وزنها الجزيئي.
. Can C , H , O
. Number 2 , 4 , 2
. x A.wt $2 \times 12 + 4 \times 1 + 16 \times 2 = 60 g \backslash mole$

What is the ~~M~~ .wt for $(NH_4)_2SO_4$?
N = 14 H = 1 S = 32 O = 16

N	H	S	O
2	8	1	4

$2 \times 14 + 1 \times 8 + 32 \times 1 + 4 \times 16 = 132 \ g \backslash mol$

Follow Lacture 1

What is the molecular wight for($CaSO_4.2H_2O$)?

$CaSO_4\,2H_2O$

Ca = 40 S = 32 H = 1 O = 16

Ca	S	H	O
1	1	4	6

$1\times40 + 1\times32 + 4\times1 + 6\times16 = 172\ g/mol$

How we can calucalat the number mole from the mass

what is the no.mases of the 30g CH_3COOH ?

$$n = \frac{mg}{m.wt} = \frac{30}{60} = 0.5\ mol$$

$$n = \frac{mg}{m.wt}$$ حساب المولات

0.2 mol CH_3COOH → mass g ?

$$0.2 = \frac{mg}{60g} \rightarrow mg = 0.2\times60 = 12g$$ CH_3COOH حساب الجرامات.

---

2. "Mole ratio:- النسب المولية

H_2O ← 2 mole H, 1 mole O = 1 mole of water contain 2H mole. 1 mole O

$$\text{or} = \frac{2\ mole\ H}{1\ mole\ H_2O} \quad \text{or} \quad \frac{1\ mole\ H_2O}{2\ mole\ H}$$

What is the number mal of H atoms in 0.3mal H_2O

No.mal H (مطلوب) = no.mol H_2O (معلوم) × mole ratio (مطلوب / معلوم)

$$\text{No.mol H} = \text{no.mol } H_2O \times \frac{\text{mol H}}{\text{mol } H_2O}$$

$$\text{No.mol H} = 0.3\ mol\ H_2O \times \frac{2\ mol\ H}{1\ mol\ H_2O}$$

$= 0.6$ mol H atom

---

follow Lacture 1

What is the no.moles of H_2O in the no.moles H atom is 3mol?

$N_{mol}\ H_2O = No.mol\ H \times$ mole ratio

$No.mol\ H_2O = 3mol\ H \times \frac{1\ mol\ H_2O}{2\ mol\ H} = \frac{3}{2} = 1.5\ mol$

. Analytical chemistry .

Qualitative Analysis

Quantitative Analysis

- Volumetric
  - Depends Measuring Volume
- Gravimetric
  - depends on the Measuring mass
- Instrumental Analysis
  - depend on the Some physical Properties

Volumetric Titration

- Acid-Base
  - Soluble salt + H_2O
  - $H^+ + OH^- \rightarrow H_2O$
- Precipitation
  - PPt insoluble compound ↓ without change in the valency
- Complexation
  - Soluble complex source other then H^+ and OH^-
- Redox
  - oxidation
  - Reduction

Titration

$A + B \longrightarrow$ Products

Known	unknown
↓	↓
titrant	titrand
↓	↓
Standard solution	Analyte ⇓ A (B + indicator)

Requirment of Volumetric T.

1- Simple and balanced chemical Reaction
2- Rapid
3- No side Reaction (C ⇓ A, B + indicator)
4- Marked change → indicator
5- Quantitative

Follow Analytical chemistry 2

Indicator weak organic acid or weak organic base

HA A + B → Product

(B + indictor) A + indicator

Requirment of indicator

1. change of the color
2. Not Volatile
3. chemically inert
4. Doesn't form insoluble compler.

Standerd Solution - Known Concentration titrant

Standerd Solution

Primary	secondary
- High purity	- Low purity
- direct	- indirect
- Does not need standardizaton	- Need standarzation

تشجع عملية التفاعل

- weak electrolyte
- H_2 gas
- PPt

Analytic chemistry 3

Solution Homogenous mixture

Solute — Solvent

Small amount — Large amount

Exciption:- H_2O aq

Mass of solution = mass of solute + mass of solvent

Volume of solution = volume of solute + volume of solvent

if 6g of Nacl was dissolved in 50g H_2O to Prepar Nacl solution

- Solute Nacl = 6g
- Solvent H_2O = 50g
- Solution mass = 56 g
- Nacl solution = 56g

what is the volume which

The density of Nacl solution is 1.28g/ml

$$d = \frac{m}{V} \quad \therefore V = \frac{m}{d}$$

$$V = \frac{56}{1.28} = 43.75 \text{ ml}$$

$$V = \frac{56}{1.28} = 43.75$$

Qualitative expersions of Concentration:-

1. Dilute solution — 2-Concentrated solution

Relative to solvent

Small amount of solute relative to solvent

Large amount of solute relative to to solvent.

Follow

Semi-Quantitative expression of concentration:-

1- Unsaturated solution: Contain less dissolve solute than it capable of

2- Saturatied solution: contain maximum amount of dissolved solute

3- supersaturated solution: contain large dissolved solute than it normally holds

* Electrolytes & Nonelectrolytes:-

1- Non Electralytes: Dissolved in solvent and formed unchanged Particals ex ~~suger~~ NaCl

2- ~~Ion~~ electrolytes:- Dissolved in solvent and formed charged Particals ex ~~Nacl~~ suger

Electrolytes classified into

Stronge electrolyte: Completely ionizes in solution $HCl \rightarrow H^+ + Cl^-$

weak elektralyte: Partically ionized in solution CH $CH_3COOH \rightleftharpoons H^+ + CH_3COO^-$

Methods for expression the concentration:-

The concentration:- is amount of solute in solution

1- Strength of solution S :- the number of grams of solute in 1L of solution Unit → g/L

$$\text{Strength} = \frac{\text{mass of solute (g)}}{\text{volume of solution ml}} \times 1000$$

Follow / /

*Examples:-

The concentration of Nacl solution is 0.2g/L what does it mean?

Means:-

0.2g of Nacl Present in 1L.

0.2g of Nacl Present in 1000ml.

.Precentage.

Percent by mass W/W

The mass of Solute in 100g of Solution

$$\%(W/W) = \frac{\text{mass of Solute(g)}}{\text{mass of Solution(g)}} \times 100\%$$

Precent by mass per volume W/V

The mass of gram of Solute in 100ml of Solution

(%) (W/V)

$$\frac{\text{mass of Solute (g)}}{\text{Volume Solvent ml}} \times 100\%$$

Percent by Volume V/V

the no. of ml of Solution in 100ml of Solution

% V/V)

$$\frac{\text{Vol. of Solute (ml)}}{\text{Vol. of Solu. (ml)}} \times 100\%$$

The concentration of Nacl Solution is 30% W/W what is Meaning?

- 30g of Nacl Present in 100ml W/V
- 30g of Nacl Present in 100 g of Solution W/W
- 30 ml of Nacl Present in 100ml V/V

• Analytical chemistray 4 •

• Mole fraction (X) :-
A with B

$$XA = \frac{nA}{nA + nB}$$ ← عدد المولات الكليه لكل المكونات

$n_t = nA + nB$ عدد المولات الكليه

• حاصل جمع الكسور المولية للخليط يجب أن تساوي 1

$$XA = \frac{nA}{nt} \qquad XB = \frac{nB}{nt} \qquad xA + xB = 1$$

A mixture consist of A and B the mole fraction of B is 0.2 what is the mole Fraction oF A ?

$xA + xB = 1$
$xA = 1 - xB$
$xA = 1 - 0.2$
$xA = 0.8$ without unit

$XA = 1 - XB$
$XA = 1 - 0.2$
$= 0.8$

Molality m :-
The number of mole of solut in 1kg of solvent
Unit :-
m / mol\kg / molal

$$\text{Molarity} = \frac{\text{no. of solvent}}{\text{mass of solvent kg}}$$

$1 dm^3 = 1L$

- The molality concentration of solvent (m) of Nacl solution is 0.1 m what is the mean?

No. moles of Nacl = 0.1 mol 1000g solvent

- What is the mass of Nacl in 0.1 m Nacl solution "m.wt for Nacl = 58.5 g/mol ?

$n = \frac{m}{m.wt}$ / $m = n \times m.wt$

No. mol of Nacl = 0.1 mol

$m = n \cdot m.wt$

$= 0.1 \times 58.5 = 5.85\ g$

$$\% (w/w)\ \text{Percentage} = \frac{\text{mass of Nacl g}}{\text{mass of Nacl.solu g}} \times 100\%$$

$$\frac{5.85\ g}{5.85 + 1000} \times 100\%$$

$$= 0.58\ \%$$

Part Per million (PPm)

عدد جزيئات المادة المذابة في مليون جزيء.

$$Cppm = \frac{\text{mass of solute g}}{\text{mass of solution g}} \times 10^6\ ppm$$

PPm

$\frac{mg}{g}$ $\frac{mg}{kg}$ $\frac{mg}{L}$ $\frac{mg}{mL}$

20 PPm of Ca^{2+} the blood

20 mg of Ca^{2+} in 1L

follow

"PPb" Part Per Billion

$\frac{ng}{g}$ $\frac{mg}{kg}$ $\frac{mg}{L}$ $\frac{ng}{ml}$

Molarity:-

The no. mole of solute in 1L of solution

Unit:

M / mol\L / Molar

$M = \frac{\text{no. moles of solute}}{\text{volume of solution (ml)}} \times 1000$

no. mass ← solute ← M (g, L)

no. mol ← M

solution

if. no of 0.25 g of Na_2Co_3 was dissolved in sufficient of H_2O and then diluted into 500ml to Prepare Na_2Co_3 solution what is the Molarity of Na_2Co_3 solution M.wt = 106 g/mol

$M = \frac{\text{no. mole of solvent}}{\text{volume of solvent}} \times 1000$

$\frac{\text{no. mol}}{\text{mass}} \quad \frac{\text{mass}}{} = \frac{0.25}{100}$

$n = \frac{\text{mass}}{\text{m.wt}} = \frac{0.25}{100} = 2.36 \times 10^{-3}$ mol

$\frac{2.36 \times 10^{-3}}{500} \times 1000 = 4.72 \times 10^{-3}$ M.

Analytical chemistry 5

Normalty (N):- Number of eq.wt of solute in 1L of solution عدد الاوزان المكافئة للماده المذابه في لتر من المحلول.

Unit of Normalty:-

N, eq/L , normal

- $\text{Normalty} = \frac{\text{No.eq.wt of solute}}{\text{No. solution ml}} \times 1000$

$$\text{No.eq.wt} = \frac{\text{mass (g)}}{\text{eq.wt}}$$

$$\text{eq.wt} = \frac{\text{m.wt}}{X}$$

X = Unit of reacting

Acid - Base

No of H^+ No of OH^-

$H_2SO_4 = 2H^+ + SO_4^{2-}$ $X = 2$ العلاقات بين الوحدات المتفاعلة

$$\text{eq.Wt} = \frac{\text{m.wt}}{X} = \frac{98.1}{2} = 49.05$$

$Ba(OH)_2 \rightarrow Ba^{2+} + 2OH$ $X = 2$

$$\text{eq.Wt} = \frac{\text{m.wt}}{X} = \frac{\text{m.wt}}{2} = \frac{114}{2} = 57$$

تحسس التي حدث لها تحليه تأين

follow

$CH_3COOH \rightleftharpoons H^+ + CH_3COO$

$eq.wt = \frac{M.wt}{X} = \frac{48}{1} = 48$

- 1 mol = M.wt of substance

$M = \frac{W}{M.wt}$ / $W = M \cdot M.wt$

Redox :-

X = no. of electron that loss or gain

$MnO_4^- \longrightarrow Mn^{2+}$

للأيون كامل

MnO_4^-

$x \quad 4x - 2 = -8$

$x - 8 = -2$

$x = +7$

$Mn^{7+} \longrightarrow Mn^{2+}$

$\searrow \quad 5 \quad \swarrow$

$MnO_4^- + e5 \rightarrow Mn^{2+}$

$Eq.Wt = \frac{M.wt}{5} = Redox$

عدد تأكسد $e^- = 0$

O يعطي 2-

ماعدا في حالة H_2O_2

فإنه يكون 1-

اشارة موجبة فقد

اشارة سالبة اكتسب

Salt :-

$eq.wt = \frac{M.wt}{X}$

الأيون الموجب في تشحنة الأيون الموجب حاصل ضرب no. of ion charge + ion of valancy = التشحنة الظاهرة / عدد الالكترونات في الغلاف الخارجي

$A_n^{+} + B_m^{-} \longrightarrow nA^{+m} + mB^{-n}$

- charge of B
- no. mol of A
- charge of A
- no. mol of B

Follow

$X = n * (+m)$ للأيون الموجب

- $CaCl_2 \rightarrow {}_1Ca^{+2} + {}_2Cl^{-1}$

$1 \times 2 = 2$

$X = 2$

$Eq.Wt = \frac{m.Wt}{x} = \frac{M.wt}{2}$

- $Mgo^{-2} \rightarrow {}_1Mg^{+2} + {}_1O^{-2}$

$1 \times 2 = 2$

$Eq.wt = \frac{M.wt}{2}$

- $Na_2(CO_3) \rightarrow {}_2Na^{+1} + {}_1CO_3^{-1}$

$Ca_nCl_{2m} \rightarrow {}_nCa^{m+} + {}_{m}Cl^{n-}$

$CaCl \rightarrow {}_1Ca^{2+} + {}_2Cl^{-}$

$x = (n \times m)$

الأيونات نوعين

mono atomic	Poly atomic
Na^+	OH^-
Cl^-	CO_3^{2-}
Br^-	NO_3^{-1}
H^+	NO_2^{-1}
	SO_3^{2-}
	SO_4^{2-}

What is the eq.wt for NaSO4 $M.wt = 142$

$X = Na_2SO_4 \rightarrow {}_2Na^{1} + SO_4^{-2}$

$x = 2$

$\frac{142\ g/mol}{2} = 71\ g/eq.$

What is the mass of Na^+, 25g NaSO4

Nomber.males NaSO4 $= 0.176\ mol$

1) No.moles Na_2SO_4:-

$n = \frac{m(g)}{M.wt} = \frac{25}{142} = 0.176\ mol$

2- No.mdes Na

No.mdes Na = No.moles $Na_2SO_4 \times \frac{2}{1}$

$= 0.176 \times 2$

$= 0.352\ mol$

follow

3- mass of Na :-

m = no. moles x A.wt

= 0.352 x 23 = 8.09 g

$Na_2SO_4 \longrightarrow 2Na^+$

142 ⟶ 46

25 ⟶ x

$x = \frac{25 \times 46}{142} = 8.09\ g$

Analytical chemistry 6

1_Relation between Molarity with (W/W)

$$M = \frac{P(W/W) \times d \times 10}{M.Wt}$$

- Solution of HCl has 20% (W/W), d = 1.18 g/ml M.W for HCl = 36.5

$$M = \frac{20 \times 1.18 \times 10}{36.5} = 6.46\ mol$$

إذا اردت 1000x اقسم 100 على %

- Percent of HCl solution is 24% (W/V), M.Wt = 36.5, M = ?

(%) W/V = W/W x d

$$M = \frac{(W/V) \times 10}{M.Wt} = 6.57\ mol$$

2_Normalty with (W/W)

$$N = \frac{\%(W/W) \times d \times 10}{Eq.Wt}$$

the percent of Na_2CO_3 is 15% (W/W), d = 1.28 g/ml, M.Wt = 106 g/1 mol, N = ?

$$eq.wt = \frac{106}{2} = 53\ g/eq$$

$$N = \frac{W/W \times d \times 10}{eq.wt} = \frac{15 \times 1.28 \times 10}{53} = 3.622\ N$$

follow

3) (W/V) with (W/W) :-

%.(W/V) = d * %.(W/W)

4) Normalty with Molarity N with M

N = X . M x = 1 M = N

Molarity for HCl is 0.2 M what is the Normalty?

I

X = 1

N = X . M

N = 1 x 0.2

N = 0.2

عندما تكون x = 1
فإن المولارية تساوي
النورمالية .

5) M with PPM

$$M = \frac{PPm \times 10^{-3}}{M.wt}$$

$$PPm = \frac{mg}{L}$$

$$\frac{PPm}{M.wt} = \frac{mg \times mol}{L \times g}$$

$$M = \frac{(W/W) \times d \times 10}{M.wt}$$

$$M = \frac{PPm \times 10^{-3}}{M.wt}$$

$$PPm = M * M.wt \times 1000$$

Concentration of the Ions

- $A_n B_m \rightarrow nA^{+m} + mB^{-n}$

$$[A^{m+}] = n * [A_n B_m]$$

- $NaCo_3 \rightarrow 2Na^+ + Co_3^{-2}$
- $[Na^+] = 2 \times [Na_2Co_3]$

What is the $[Na^+]$ $[Na_2SO_4] = 0.1M$?

$$Na_2SO_4 \rightarrow 2Na^+ + SO_4^{2-}$$

$$Na^+ = 2 * [Na_2SO_4]$$

$$2 \times 0.1 = 0.2\ M$$

What is the $[Cl^-]$ in 200ml of 0.2N $CaCl_2$

$$CaCl_2 \rightarrow {}_1Ca^{2+} + 2Cl^{-1}$$

$$N = X \cdot M$$

$$X = \frac{N}{x} = \frac{0.2}{2} = 0.1\ M$$

$$Cl^- = 0.1 \times 2 = 0.2$$

$$Cl = 2 \times CaCl_2$$

$$= 2 \times 0.1 = 0.2\ m$$

2 ← عدد الالكترونيه الأيونات

0.1 ← المولاريه

- تركيز المركب بـ normality .
- تركيز الايونات لايقبل الا molarity
- في تركيز الايونات الحجم ليس له معنى

Analytical chemistry ♥

Na_2CO_3 in 3.9L of 0.170 N

$$N = \frac{\text{number of equivalents weight}}{\text{volume of solution}}$$

$$0.170 = \frac{\text{no.eq.wt}}{3.9\text{ ml}} \times \frac{1000}{1} = 0.170 \quad \frac{\text{no.eq.wt} \times 1000}{3.9}$$

$$\text{n.eq.wt} = \frac{0.170 \times 3.9}{1000}$$

$$= 6.63 \times 10^{-4}$$

$$\frac{\text{m.wt}}{X} = \frac{106}{2} = 53$$

$$\text{no.eq} = \frac{\text{mass of sdute}}{\text{eq wt}}$$

Mass of Solut $= 6.63 \times 10^{-4} \times 53 = 0.0351$ g

Positive Cation $Na^+ / K^+ / Ca^+ / mg^+$

negative anion $HCO_3^- - SO_4^{-2}$ cl

Follow "

By Percent

Quantity ← $Q_1 \times C_1 = Q_2 \times C_2$
concentration

15% 500 → 1500 ml
15 → C2 % ?

$500 \times 5\% = 1500 \times C_2$

$C_2 = \frac{500 \times 15\%}{1500} = 5\%$

By mixing

How you can you Prepare 200ml of 20% From Hcl from 50% and 30% Hcl solution? كيف

الأعلى 50% — 10
المطلوب 20 — + = 40 Parts
الأقل 30% — 30

. The volume From 50% = Total Volum x ratio
$200ml \times \frac{10}{40} = 50 ml$

. The volume From 30% = $V \times \frac{30}{40}$

$200 \times \frac{30}{40} = 150 ml$

الملاحظة إذا جمعت النسبتين يطلع لي 200

Follow Analytical / /

• Calculation by using

• normalty :-

$$N = \frac{\text{no. of equalevs wt}}{V(ml)} \times 1000$$

number eq. wt $= \frac{m \times V ml}{100}$

no. of equivalent $= \frac{mg}{eq.wt}$

• Mass = no. eq wt * eq. wt

$A + B \rightarrow (No.eq.wt)_A = (No.Eq.wt)_B$ *

• if 0.30 g Na_2CO_3 was titrated with 10 ml of HCl what is the normalty of HCL solution

---

Normalty $= \frac{\text{No. of eq. wt}}{V(mL)} \times 1000$

$(No.Eq.wt)_{HCl} = (no.eq.wt)_{NaCO_3}$

$No.eq.wt = \frac{(mg}{Eq.wt}$

$Na_2CO_3 = 2Na^+ + CO_3^{-2}$

$x = 2$

$Eq.wt = \frac{m.wt}{x} = \frac{106}{2} = 53$ g/eq

no. eq. wt $= \frac{0.30}{53} = 5.66 \times 10^{-3}$ eq

no eq. wt HCl $= 5.66 \times 10^{-3}$ eq

normalty of Hcl solution

$\frac{5.66 \times 10^{-3}}{10} \times 1000 = 0.566\ N$ //

Follow

$N_1 \times V_1 = N_2 \times V_2$ حسابات المجهول من معلوم

10 ml of 0.2 N HCl was titrated with 20 ml of Na_2CO_3 what

$m_1 \times V_1 = m_2 \times V_2$ قانون التخفيف

---

2. Molarity

molarity = $m = \frac{n.mal}{V(ml)} \times 1000$

n = .

$n = \frac{M \times V(ml)}{1000}$ $n = \frac{mass(g)}{m.wt}$

X = HCl = 1

M = N

• mole ratio نسبة المولات

1- $No = \frac{mass}{m.wt} = \frac{0.03}{106} = 2.83 \times 10^{-3}$

$2HCl + Na_2CO_3 \rightarrow 2NaCl + H_2CO_3$

No. mol HCl = n.o.mal HCl = n. moles $Na_2CO_3 \times \frac{2 mal\ HCl}{1 mol\ H_2CO_3}$

2.83×10^{-3} mal $Na_2C_3 = \frac{2 mal\ HCl}{1 mol\ Na_2CO_3}$

$= 5.66 \times 10^{-3}$ mol

molarity of Hcl solution = $\frac{no.mol}{v\ ml} \times 1000 = 5.66 \times 10^{-3}$

$\frac{5.66 \times 10^{-3}}{10} = 1000 = 0.566\ M$

Analytical chemistry

Chapter: 3

- Acid_Base :-
- Condichiv to electristy
  39 p الخواص

Litmus paper

Base	acid
Blue	red

1. Arrhenius Defnation :.
   acid :- any substance ionize in H_2O and produce H^+
   Base :- any substance ionize in H_2O and produce OH^-

2. Lowry Defnation Bronsted:-
   acid :- any substance has ability to donate Proton H^+
   Base:- Has ability to accept Protone H^+

$$HCl + NaOH \rightarrow NaCl + H_2O$$
$$HCl + H_2O \rightarrow H_3O^+ + Cl^-$$
هيدرونيوم

3. Lewis:-
   - Acid :- has ability to acept electron pairs.
   - Base:- has ability to donate electron pairs

Conjugate

رابطه ضعيفه تأين اقوى
" قويه " ضعيف

HCl → strange acid
HF → weak acid

HCl
Stronge acid

Conjugate :-

- Acid conjugate:- Add ion H^+
- Base conjugate remove H^+ ion

What is the acid conjugate For $Hso4^-$?

a) $So4^{2-}$ b) $\underline{H2so4}$ c) $H2SO4^+$

شرح :- تشحنه - اخفت لها + اصبح تعادل

What is the Base conjugate For $HCo3^-$?

$Co3^{-2}$

شرح :- بسبب إزاله الـ H^+ " من التعريف ".

What is the conjugate For " Conjugate Base) $Hso4^-$

- كلما كان الحمض قوي يبقي الـ conjugate ضعيف
- كلما كان القاعده قويه " ضعيفه

$HCl \rightleftharpoons Cl^- + H^+$

Strong acid — Weak Conjugated Base

- لايميل للعوده للتسهل الاول . لانه ضعيف

$CH_3C(=O)-OH \rightleftharpoons H^+ + CH_3C(=O)-O^-$

Strong — العوده اليه اسهل

ذكر الـ Ka او Kp فهو حمض ضعيف او قاعده ضعيفه

Stronge acid strong acid

Weak acid

معطاه $CH_3\overset{O}{\overset{\|}{C}}-OH$

$Ka = 1 \times 10^{-5}$ ثابت التأين

What is the Kp للقواعد

Weak Base

What is the volume of ka For CH_3COO^-

$Ka * Kp = Kw = \boxed{Kw} \rightarrow = 1 \times 10^{-14}$ ثابت

$$Kp = \frac{Kw}{Ka} = \frac{1 \times 10^{-14}}{1 \times 10^{-5}} = 1 \times 10^{-9}$$

• قيمه التأين له ضعيف لذلك يميل للعوده الى اصله ولايفضل التشكل الايوني .

عندما يكون الرابطه قويه يكون weak والعكس صحيح لانه لايستطيع تأين تام

• $HF \rightleftharpoons H^+ + F^-$ weak

• $HCl \rightleftharpoons H^+ + Cl^-$ strong

↑ الكهروسالبيه كلما كان

↑ K strong فهو

↓ K weak

صنعه الكهراء

1 mol

Strong acid

Strong Base complete ioinezs

- $NaOH \rightarrow Na^+ + OH^-$
  $OH^- = NaOH$

- $KOH \rightarrow K^+ + OH^-$
  $[OH^-] = [KOH]$

- $LiOH \rightarrow Li^+ + OH^-$
  $[OH^-] = LiOH$

- $Ca(OH)_2 \rightarrow Ca^{+2} + 2OH^-$
  $[OH]^+ = 2 \times [Ca(OH)_2]$

- $Sr(OH)_2 \rightarrow Cr^{+2} + 2OH^-$
  $[OH]^- = 2 \times [Sr(OH_2)]$

- $Ba(OH)_2 \rightarrow Ba^{2+} + 2OH^-$
  $[OH^-] = 2 \times [Ba(OH)_2]$

Kw, Ion Product of H_2O

$H_2O \rightleftharpoons H^+ + OH^-$

$[A^+]$ $[H]^+$ $[OH^-]$ Kw

H_3O At $25^\circ C$ $Kw = 1 \times 10^{-14}$

الكاصل الايوني الKw ا
الماء ionize & weak electrolit

H^+
H_3O Proton

حاصل ضرب تركيز ايون H
في ضرب تركيز Ho
يكون متساوي
$10^{-14} \times 1$ الصحراوي

ALADIB

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$[H^+]\ [OH]^- = 1 \times 10^{-14}$

$H^+ = \frac{1 \times 10^{-14}}{[OH]^-} = [OH^-] = \frac{1 \times 10^{-14}}{[H^+]}$

what is the $[H^+]$ For a solution

$[OH^-] = 0.0004\ M$

$= 4 \times 10^{-4}\ M$ بالدسيمري

$H^+ = \frac{1 \times 10^{-14}}{[OH]\ 1 \times 10^{-4}} = \boxed{6.25 \times 10^{-10}\ M}$

acidic Basic - neutral

H ion اعلى OH

$H^+ > OH^-$ greater then oH solution acidic

$OH^- > H^+$ solution basic

$H^+ = OH^- = 1 \times 10^{-7}\ M$ Solution neutral

PH = scale

small capital

$PH = -\log [H^+]$

$PoH = -\log [OH^-]$

$pKw = -\log Kw$

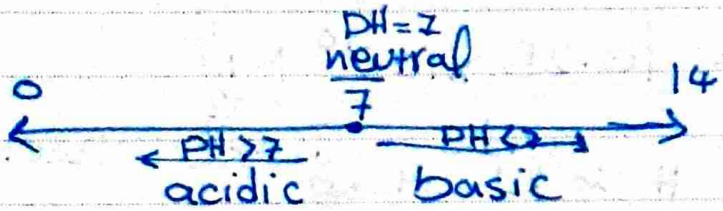
$pNa = -\log [Na^+]$ تركيز ايون الصوديوم

خصائص اللوغريتم
× جمع الاسس ضرب
÷ طرح /

$[H^+]\ [OH^-] = 1 \times 10^{-14}$

$PH + pOH = 14$

$PH = 14 - pOH$ $\qquad$ $pOH = 14 - PH$



- Solution $pOH = 4$

$PH = 14 - 4 = 10$

acidic - Basic - Neutral

what is the pH for solution

$[OH^-] = 0.0004\ M$ $\qquad$ $[OH^-] = 4 \times 10^{-14}\ M$

$PH = ?$

$PH = \log[H^+]$ $\qquad$ $PH = 14 - pOH$

$[H^+] = \frac{1 \times 10^{-14}}{OH} = \frac{1 \times 10^{14-}}{4 \times 10^{-4}} = 0.25 \times 10^{-10}\ M$

$pH = -\log[H^+] = -\log(0.25 \times 10^{-10}) = 10.6$

طريقة أخرى

- $POH = -\log [OH]^-$
  $= -\log [4 \times 10^{-4}]$
  $= 3.4$

- $pH = 14 - POH$
  $14 - 3.4$
  $= 10.6$

Stronge acid

$H_2SO_4 \longrightarrow 2H^+ + SO_4^{-2}$

$[H^+] = 2 * [H_2SO_4]$

.What is the poH value for 0.2 M H_2SO_4?

$H_2SO_4 \longrightarrow$ Stronge acid تتأين بالكامل

$H_2SO_4 \rightarrow 2H^+ + SO_4^{2-}$

$H^+ = 2 * [H_2SO_4]$
$2 * 0.1 = 0.2\ M$

POH

$POH = -\log [OH]$ $\quad$ $POH = 14 - PH$

$[H^+] = 0.2\ M = 0.7$
$POH = 14 - PH \rightarrow 14 - 0.7 = 13.3$

$H^+ = 0.2\ M$

$PH = -\log [H]^+ = -\log (0.2) = 0.7$

$[OH^-] = \frac{1 \times 10^{-14}}{H+} = \frac{1 \times 10^{-14}}{0.2} = 5 \times 10^{-14}$

$P_{OH} = -\log = [OH]^-$

$= -\log (5 \times 10^{-14})$

$= 13.3$